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| 09/125,128 | 08/11/1998 | YUICHIRO IGUCHI | 1084-98 | 7453 |

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| EXAMINER |
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LIN, JAMES

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| ART UNIT | PAPER NUMBER |
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1762

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
|--|------------|---------------|
| 3 MONTHS | 01/23/2007 | PAPER |

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

09/125,128

Applicant(s)

IGUCHI ET AL.

Examiner

Jimmy Lin

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 December 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 121-164 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 138-139 is/are allowed.
- 6) ☒ Claim(s) 121-137 and 140-164 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/5/2006 has been entered.
2. Amendments to the specification filed on 12/5/2006 will be entered.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 123 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 123 is inconsistent with parent claim 121 because the parent claim requires substantially all of the spaces to be coated with the phosphor while claim 123 only requires certain spaces to be coated.

5. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
6. Claims 121-137, 140-153, and 158-164 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There is no support for applying a single phosphor paste for a single light emitting color into the spaces between substantially all of the barrier ribs (claims 121 and 141). Also, there is no support for applying one phosphor paste over another phosphor paste, nor is there support for applying phosphor paste to the spaces between substantially all of the barrier ribs in only two passes (claims 134 and 152). Similarly, there is no support for applying three different phosphor pastes over one another (claim 153). Example 4 of the present specification suggests that a phosphor layer for a particular light emitting color is applied in a one time pass, during which all of the respective spaces for that particular color are coated with the phosphor.

The specification has no support for a paste applicator having 600 to 2000 outlet holes (claims 158-160). There is only support for the ranges of 1-6000, 20-200, 20-2000, and 150-2000 outlet holes. Although the ranges encompass 600 outlet holes, such a number is not provided as an endpoint of a range.

There is not sufficient evidence in the specification to support the limitation of applying the phosphor paste into the spaces between the barrier ribs across *the entire base substrate*. The Applicant points to the bridging paragraph of pgs. 19-20. Although the noted paragraph supports fully coating the substrate with a glass paste (to form the barrier ribs), certain portions of the glass paste are removed to form a certain pattern. The paragraph is unclear as to how much of the glass paste is removed. In particular, it is unclear if the barrier ribs span the entire base substrate after portions of the glass paste is removed. Referring now to the Applicant's response when referring to the support found in the specification (pg. 42 of response filed 12/05/2006), the Applicant notes that "if several millimeters or even several centimeters do not contain barrier ribs, it is unimportant since that portion of the base substrate will not be an active portion of the plasma screen". This is an admission that the barrier ribs do not span the entire length of the substrate. Support for the claim is not an issue of the importance or unimportance thereof. Instead, the criteria that must be met is that all the limitations of the claim must be fully supported in the disclosure submitted at the time of filing.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 121-123, 125-127, 129-134, 137, 141, 143, 147-154, 158-161 and 164 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanto et al. (U.S. Patent 5,921,836).

Nanto teaches a method of and apparatus for forming a plasma display panel using a paste applicator with a plurality of nozzles (and therefore a plurality of holes) in a flat plate (See Figs. 16, 22) at the same time (See Figs. 20-22) to continuously deposit a phosphor paste including an organic binder to form a phosphor layer on a substrate with a plurality of barrier ribs (col. 4, lines 16-39) supported on a table (51) by moving the applicator and table relative to one another. The phosphors may be of three colors (red, green, and blue), applied as stripes, and dried (col. 1, line 58-col. 2, line 12). The dried films coat the substrate, anode, and sides of the barrier ribs. See, for instance, Fig. 1.

Nanto suggests using a substrate with a hole diameter of 100 microns (col. 4, lines 36-39).

Nanto does not explicitly teach an outlet hole pitch of 0.12 to 3 mm nor the use of 150-2000 outlet holes. However, it does teach that the outlet hole pitch is determined by the rib pitch (col. 11, lines 41-59). Nanto suggests a spacing (S) between barrier ribs of 170 microns (col. 4, lines 36-39) and a rib width (W) of 50 microns (col. 8, lines 1-12), thereby suggesting a rib pitch ($P=S+W$) of 220 microns. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have use a hole pitch of about 220 microns (0.22 mm)

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as the particular hole pitch because Nanto teaches that the hole pitch should be the same as the rib pitch. Nanto explicitly teaches that there may be 5-30 nozzles (col. 4, lines 26-39).

However, given that there are many stripes to be formed (see, e.g., col. 8, lines 1-2), it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used more nozzles in order to have decreased processing time. Nanto that there may be 1920 grooves (col. 8, lines 1-5). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used an applicator with up to 1920 holes in order to have coated the substrate in a single pass in order to have decreased processing time.

Alternatively, for a multicolor device, there are up to 640 grooves of each color (col. 8, lines 9-12), suggesting the use of 640 nozzles at a pitch of 0.64 mm.

Claims 122, 125: Nanto suggests using a substrate with a spacing S of 170 microns and D of 100 microns (col. 4, lines 36-39).

Claims 123: The hole pitch may be six times the barrier pitch (col. 11, lines 45-53).

Claim 125-126, 143: Nanto suggests a hole diameter of 100 microns and spacing of 170 microns (col. 4, lines 30-34).

Claim 127: The clearance (distance between the nozzle tips and barrier top) should be kept constant. Typical values are 0.1-0.2 mm (col. 6, lines 3-13).

Claims 131-132: Nanto does not explicitly teach Applicant's claimed ranges of the outlet hole pitch, phosphor paste compositions or viscosities, barrier rib characteristics, and spacing between stripes. The resolution is affected by variables such as the distance between stripes of different colors, barrier height, width, and pitch. The viscosity of the paste is affected by the composition of the paste (col. 4, lines 16-20, col. 7, line 66-col. 8, line 19). The outlet hole pitch is determined by the rib pitch (col. 11, lines 41-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized these characteristics for the desired resolution and paste thickness.

Claim 129: Nanto does not explicitly teach Applicant's claimed order of application. The coating process begins outside of the region of effective display (col. 6, lines 35-41), apparently so that nonuniformities during the beginning of the deposition are not seen in the final product. By extension, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have continued movement beyond the effective region at the end of each

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stripe as well to prevent nonuniformities at the end of the process. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have begun moving the nozzle before deposition and stopped after deposition ceased in order to avoid nonuniformities in the effective region of the display panel.

Claim 130: The phosphor layers are dried with heat (col. 11, lines 10-13).

Claim 133: The top of the ribs may be colored black (col. 5, line 59-col. 6, line 2).

Claims 134 and 137: Multiple applicators may be provided to apply the phosphors in series (Fig. 13).

Claim 147: The apparatus may have means to detect the position of the tips of the outlet holes, which may be flush with the flat plate (Figs. 20-22) and the tops of the barrier ribs (col. 6, lines 3-20) and controlling the area of application (col. 6, lines 3-50).

Claim 148: The distance between the ribs and nozzle tips is kept constant (col. 6, lines 3-14). The apparatus has means to adjust the inclination degree of the applicator nozzles (col. 12, lines 40-49).

Claim 149: The apparatus has means to detect the position of the phosphor paste (col. 7, lines 24-32).

Claim 150-153: The apparatus comprises means to recognize alignment marks that determine the positions of the ribs and grooves (i.e., spaces) so that the phosphor may be deposited in the grooves (col. 5, line 48-col. 6, line 2).

Claims 161,164: The phosphor is deposited along the entire length of the barrier ribs.

10. Claims 124 and 142 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanto '836 as applied to claims 121 and 141 above, and further in view of Ravi-Chandar et al. (U.S. Patent 5,656,574).

Nanto does not describe the use of outlet holes with a length/diameter ratio of 0.1-600. The Examiner takes official notice that the length to diameter ratio of a nozzle for dispensing pastes is known to affect the rheological properties and therefore the dispensing efficiency of the nozzle. See, for instance, the extrusion process described in Ravi-Chandar, col. 6, lines 40-49. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the length-to-diameter ratio of the paste applicator of Nanto for the optimum rheological properties.

11. Claims 128 and 146 are rejected under 35 U.S.C. 103(a) as being unpatentable over '836 as applied to claims 121 and 141 and further in view of Mettenbrink (U.S. Patent 4,775,080).

Nanto is described above. Nanto also teaches that the apparatus comprises pressure adjusting and controlling means to dispense the paste (col. 7, lines 48-54). Nanto does not teach that the pressure may be designed to be negative. However, clogging of the nozzle is taught as disadvantageous (col. 9, lines 59-62). It is well known to prevent the formation of dried beads of material that clog nozzles by applying a vacuum to the nozzle when the dispensing stops. As an example, Mettenbrink teaches the operation of a toothpaste dispenser, in which a vacuum is formed in the nozzle that avoids the formation of a plug of hardened paste outside the nozzle (col. 8, lines 33-40). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have allowed the adjusting means of Nanto to apply a negative pressure to draw undispensed material back into the nozzle at the end of dispensing in order to prevent clogging of the nozzles.

12. Claim 131 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nanto '836 as applied to claim 121 above and further in view of Osaka (U.S. Patent 5,277,840).

Nanto does not teach Applicant's specifically claimed ranges of the grain size, specific surface area, or paste viscosity.

Osaka teaches that the particle size and viscosity of phosphor pastes are known to affect the light-emitting characteristics and resolution (col. 3, lines 8-39 and Abstract). The size distribution necessarily affects the specific surface area. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to have optimized the size distribution, specific surface area and paste viscosity of '553 for the best light-emitting characteristics and resolution.

13. Claims 134-137, 152-153, 156, and 162-163 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanto '836 as applied to claim 121 above and further in view of Koike et al. (U.S. Patent 5,767,876).

Nanto is discussed above. It further teaches that multiple applicators may be provided to apply the phosphors in series (Fig. 13) but does not explicitly teach the use of two paste applicators that are moved relative to the same table simultaneously.

However, Koike teaches that when depositing multiple colors from ink nozzles in patterns such as stripes (see, e.g., Fig. 46), each color ink may be deposited from adjacent rows of nozzles in a unified collection of applicators (col. 11, lines 40-56; Fig. 1). Thus, discharging may be simultaneous, and the rows travel at the same speed. Taking the references as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used multiple applicators to distribute the multiple phosphors simultaneously in order to reduce the processing times. In such an embodiment, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have three staggered sets of nozzles, each set with its own distribution system to supply different colored phosphors in order to reduce the processing time by applying all the stripes simultaneously.

14. Claims 140 and 155 are rejected under 35 U.S.C. 103(a) as being unpatentable over '836 as applied to claim 121 above, and further in view of Kohli et al. (U.S. Patent 5,741,746).

Nanto is discussed above, but does not explicitly teach that the PDP is made by joining the phosphor substrate with a rear substrate having a plurality of electrodes and injecting a rare gas between the substrates. However, the Examiner takes Official Notice that such is an extremely well known method of preparing PDP devices from the phosphor screens. See, e.g., Kohli, col. 2, lines 46-61). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have joined the substrate of Nanto to another with a plurality of electrodes and filled the intervening space with gas because such is the conventional method of assembling PDPs.

15. Claim 157 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nanto '836 in view of Koike '876 as applied to claim 156 above, and further in view of Kohli '746 for substantially the same reasons as discussed immediately above.

16. Claims 144-145 are rejected under 35 U.S.C. 103(a) as being unpatentable over '836 as applied to claim 141 above, and further in view of Silverbrook (U.S. Patent 5,850,241).

Nanto teaches the limitations of claim 92, but does not teach that the nozzle is coated with a fluorine-based resin or amorphous carbon film. Silverbrook teaches that ink-jet nozzles may be coated with hydrophobic films such as an amorphous carbon film (col. 38, line 66-col. 39, line 30) to prevent reaction between the nozzle and polar solvent-based inks. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a hydrophobically coated nozzle in order to deposit the paste of Nanto when the desired paste uses a polar solvent as a vehicle to prevent interactions between the paste and the nozzle. Silverbrook teaches amorphous carbon and fluorinated diamond films. The Examiner takes official notice that fluororesins are notoriously well-known hydrophobic coatings. Thus it would have been obvious to one of ordinary skill in the art at the time the invention was made to have used a fluorinated resin as the hydrophobic coating material with the expectation of similar results.

Allowable Subject Matter

17. Claims 138-139 are allowed.

18. The following is an examiner's statement of reasons for allowance: the Applicant has shown unexpected results for applying phosphor paste to substantially all the spaces between the barrier ribs.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Response to Arguments

19. Applicant's arguments filed 12/5/2006 have been fully considered but they are not persuasive.

The Applicant argues that Nanto fails to disclose 150 to 2000 outlet holes, but rather teaches that it is quite difficult to use a plurality of nozzles such as even the 5-30 nozzles explicitly disclosed. However, coating with a plurality of nozzles, although difficult, is not

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inoperable. In fact, Nanto teaches that a plurality of nozzles actually provide an efficient coating step (col. 4, lines 34-39), thus providing an explicit motivation to use a plurality of nozzles. Nanto further teaches modifications to the paste applicator to overcome the difficulties, as admitted by the Applicant. Therefore, there is no explicit or implicit teaching that applying phosphor paste with a plurality of nozzles is inoperable.

The Applicant argues that Nanto in no way suggests increasing the number of nozzles beyond 5-30. However, based on the explicit motivation that using a plurality of nozzles increases efficiency, it would have been obvious to one of ordinary skill in the art at the time of invention to have used more than the exemplified 5-30 nozzles because Nanto teaches that a substrate can have 1920 spaces to be coated (col. 7, line 66-col. 8, line 5) and because using up to 1920 nozzles would have provided for a deposition step with even greater efficiency.

The Applicant argues that Nanto uses a multipass method to apply the phosphor paste while the present invention uses a single pass. The Applicant further argues that unexpected results were set forth in the Applicant's Declaration submitted on October 24, 2005. However, claims 121-137 and 140-153 are not commensurate in scope with Examples 4, 8, or 9 and present new matter that is not disclosed in the specification. If the claims were rewritten such that the application of the phosphor paste is commensurate in scope with the above Examples, the claims would overcome the obviousness-type rejection over Nanto.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jimmy Lin whose telephone number is 571-272-8902. The examiner can normally be reached on Monday thru Friday 8AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on 571-272-1423. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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KEITH HENDRICKS
PRIMARY EXAMINER